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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/536,721	03/28/2000	Toshiaki Hongoh	PM 266959	5386

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EXAMINER

CROWELL, ANNA M

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 04/03/2003

17

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/536,721

Applicant(s)

HONGO, TOSHIKI

Examiner

Michelle Crowell

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 March 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 and 18-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 18-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-9 and 18-25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation, “by heating at least one of the slot electrode and component parts including the wavelength reducing member above a lower temperature limit and cooling at least one of the slot electrode and component parts including the wavelength reducing member below a higher temperature limit”. This portion of the claim is vague. The examiner interprets this limitation to include two separate systems- a heating device and a cooling device. Therefore, both the heating device and the cooling device are provided in the vicinity of the slot electrode.

Examiner suggests to include the following in claim 1:

a fluid supply tube connected to a fluid passage in a temperature control plate and a heating wire wound on the fluid supply tube which provides heating at least one of the slot electrode and component parts including the wavelength reducing member above a lower temperature limit and cooling at least one of the slot electrode and component parts including the wavelength reducing member below a higher temperature limit.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 1, 2, and 4-7 rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al. (U.S. 5,698,036) in view of Orezyk et al. (U.S. 5,937,323).

Referring to Figures 14-19, column 11, line 46- column 12, line 67, and column 14, line 60 – column 15, line 13, Ishii discloses a microwave plasma processing apparatus comprising a microwave introducing port 81 which introduces microwaves into the processing container 4 (processing chamber), dielectric material 80 for shortening the guide wavelength of the microwave (wavelength reducing member), a flat antenna member 44 (slot electrode) to form an electrostatic field in the processing space S, a dielectric-material accommodation portion 82a (antenna accommodating member) of the antenna covering member 82 which covers the dielectric material 80, and a ceramic protective plate 92 (dielectric material member) formed on the lower surface of the antenna member 44 that protects the antenna member 44 from plasma.

On the upper surface of the antenna covering member 82, cooling fins 84 (first temperature control device), cooling fans, or cooling jacket may be used to cool the flat antenna member 44, dielectric material 80, and dielectric accommodating portion 82a. Also, a cooling jacket 18 (second temperature control device) in support frame 8 cools the processing wafer.

Ishii fails to teach a heating and cooling at least one of the slot electrode and components parts including the wavelength reducing member.

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Referring to Figure 1a and column 4, lines 66 – column 5, line 8, Orezyk teaches a temperature control plate including a cold plate 24 and a heater plate 23. The cold plate 24 and heater plate 23 are provided on the dome 14 (dielectric) and the top coil 29 (electrode) to control the temperature of the dome at a specific range. Providing the temperature control plate to the dome reduces the flake or particle counts in the chamber. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the slot electrode and wavelength reducing member of Ishii with the temperature control plate as taught by Orezyk. This would reduce the amount of particle flaking from the chamber's components.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al. (U.S. 5,698,036) in view of Orezyk et al. (U.S. 5,937,323).

Regarding the temperature of the temperature control device, it would have been obvious to one of ordinary skill in the art at the time of the invention to maintain the temperature of the slot electrode in a predetermined range of 60-80°C. This would prevent the slot electrode from physical deterioration and yield optimum processing conditions. The fact that Ishii in view of Orezyk are controlling the temperature establishes that it is a result effective variable and thus

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obvious to optimize through routine experimentation. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

7. Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al. (U.S. 5,698,036) in view of Orezyk et al. (U.S. 5,937,323) as applied to claims 1, 2, and 4-7 above, and further in view of Trow et al. (U.S. 5,824,607).

Ishii fails to teach a temperature control device for the periphery of a dielectric material member and a sidewall.

Referring to Figure 1, column 3, lines 60-63, and column 4, lines 40-50, Trow teaches that it is well known to control the temperature of the entire dielectric material member 17W, 17T (including periphery) and the chamber walls 12 (sidewalls). Components 92, 94, 96 (temperature control device) provide a heat transfer medium to the chamber components 17W, 17T, 12 for temperature control. The temperature of these chamber components is controlled to enhance processing performance. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to control the temperature of the periphery of a dielectric material member and a sidewall of Ishii in view of Orezyk as taught by Trow. By controlling the temperature of dielectric material member and a sidewall, processing performance is enhanced.

8. Claims 18-20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al. (U.S. 5,698,036) in view of Orezyk et al. (U.S. 5,937,323) as applied to claims 1, 2, and 4-7 above, and further in view of Fujimoto et al. (Japanese Patent Publication 01-072526).

Ishii fails to specifically teach a control unit, temperature sensor, and a heater.

Referring to the abstract and Drawings 1 and 2, Fujimoto teaches a microwave plasma

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processor with an electrode 8 (slot electrode) connected to temperature control means (control unit). The temperature control means includes a heater 12 (heating wire), heater power source 9, and a thermometer 13 (thermocouple). The heater power source controls a current, which is made to flow through the heater 12 (heating wire) based on the detected temperature. It is important to control the temperature of the electrode in order to prevent instability in the plasma. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the slot electrode and wavelength reducing member of Ishii with control unit, temperature sensor and heater as taught by Fujimoto. By controlling the temperature of the slot electrode and wavelength reducing member, instability of the plasma is prevented.

9. Claims 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al. (U.S. 5,698,036) in view of Orezyk et al. (U.S. 5,937,323) and as applied to claims 1, 2, 4-7 above, and further in view Shirasago et al. (Japanese Patent Publication 02-197575) and Trow et al. (U.S. 5,824,607).

Ishii in view of Orezyk fails to teach a fluid controller with fluid flowing o a temperature control plate.

Referring to the abstract, Shirasago teaches an electrode 110 provided with a pipe 1102 for flowing a fluid. The temperature of the fluid is measured using a thermocouple 1101 and controlled by a temperature controller 1103. Furthermore, a feeder 1104 (mass flow controller and stop valve) regulates the feed rate of the fluid inside the pipe. It is important to control the temperature of the electrode 110 in order to control the potential of the plasma. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the

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temperature control plate of Ishii in view of Orezyk with a fluid controller as taught by Shirasago. By controlling the temperature of the electrode, the potential of the plasma is controlled.

Referring to Figure 1, column 3, lines 60-63, and column 4, lines 40-50, Trow teaches that it is well known to supply a fluid to a dielectric material member 17W, 17T (temperature control plate). Components 94, 96 (temperature control device) provide a heat transfer medium to the dielectric material member 17W, 17T (temperature control plate) for temperature control. The temperature of the dielectric material member is controlled to enhance processing performance. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the temperature control plate of Ishii in view of Orezyk with the temperature control plate as taught by Trow. By controlling the temperature of temperature control plate, processing performance is enhanced.

Response to Arguments

10. Applicant's arguments with respect to claims 1-9 and 18-25 have been considered but are moot in view of the new ground(s) of rejection.

Regarding Claims 18-20 and 22

Applicant has argued that Fujimoto is not a slot electrode, thus Fujimoto teaches away from using a slot electrode and Fujiimoto and Ishii can't be combined.

Ishii discloses providing a slot electrode. The teachings of Fujimoto were simply used to demonstrate that a temperature control device including a control unit, a temperature sensor and

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a heater could be provided in the vicinity of an electrode (slotted or not). The motivation to combine Ishii with Fujimoto is to prevent plasma instability.

Allowable Subject Matter

11. Claims 21 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

12. The following is a statement of reasons for the indication of allowable subject matter: a temperature control device with a control unit, temperature sensor, and a heating wire wound on a fluid supply tube connected to a fluid passage in a temperature control plate to supply a fluid to the temperature control plate is patentable over the prior art.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Crowell whose telephone number is (703) 305-1956. The examiner can normally be reached on M-F (8:00 - 4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (703) 308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

AMC *ame*
April 1, 2003


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